This record is a partial extract of the original cable. The full text of the original cable is not available.

UNCLAS SECTION 01 OF 04 OTTAWA 002125

SIPDIS

E.O. 12958: N/A
TAGS: SENV ENRG TRGY CA
SUBJECT: CANADA: HIGH ON HYDROGEN

REF: REF: (A) STATE 146268 (B) OTTAWA 01721

¶1. SUMMARY: This cable provides an overview of Canada's public and private efforts to develop technologies for the use of hydrogen as a fuel. Natural Resources Canada (NRCan) is drafting a detailed national plan for directing Canadian hydrogen efforts ("Canadian Hydrogen Roadmap"), but it is at least one year away from completion, according to GOC officials. On April 15, Industry Canada released its "Canadian Fuel Cell Commercialisation Roadmap," a document that will complement the expected "Hydrogen Roadmap." Research teams at the National Research Council (NRC) labs in Ottawa and Vancouver are working on the next generation of PEM (proton-exchange membrane) and solid oxide fuel cell (SOFC) components to find ways to lower the cost, reduce the size, and improve the efficiency of fuel cells. High-profile Canadian corporations, some of them world leaders in their field, are also doing their part to spur the development of hydrogen-related technology and infrastructure in Canada (see paras 10-11). Given its expertise in some hydrogen technologies, Canada could contribute significantly to the development of the hydrogen economy in North America, and we recommend continued close collaboration between governments and the private sectors of the US and Canada. END SUMMARY.

GOC: BRING ON THE HYDROGEN ECONOMY

¶2. The Canadian Government (GOC) has made a multi-agency commitment to developing the hydrogen economy. Natural Resources Canada's (NRCan's) hydrogen-related research and development (H2 R&D) is handled by the CANMET Energy Technology Centre (CETC). Vesna Scepanovic, Hydrogen and Fuel Cell Program Manager of the CETC, highlighted for Emboff the GOC's strong interest in supporting private H2 R&D, as well as performing some of its own. She emphasized NRCan's leading role in 20 years of H2 R&D for a total expenditure of C$183 million (US$133 million), not including the new Canadian Transportation Fuel Cell Alliance (see para 3). She pointed out that more recently involved GOC agencies include Transport Canada, the National Research Council (NRC), and Environment Canada. Scepanovic said that Industry Canada and the Department of National Defence (DND) are becoming more interested in the use of hydrogen, as shown by Industry Canada's release of the Fuel Cell Commercialisation Roadmap in April (see paras 7-9). Scepanovic mentioned that NRCan is currently working on a Canadian Hydrogen Roadmap that will take at least one year to develop. She commented that it should have predated the Fuel Cell Roadmap because the new Hydrogen Roadmap will be a more comprehensive plan, including, but not limited to, fuel cell technology.

¶3. In 2000, under the Canadian Climate Change Action Plan, CETC created the Canadian Transportation Fuel Cell Alliance (CTFCA). The CTFCA is an organization that brings together more than 60 universities, private companies, and government agencies. Richard Fry, CTFCA's Fuel Cell Infrastructure Program Manager, told Emboff that his program will receive C$23 million (US$17 million) over five years (ending in 2005) through NRCan to fund projects on hydrogen fueling stations and demonstrations of hydrogen production from methanol, natural gas, electrolysis, and recovery of waste hydrogen. Fry acknowledged some GOC interest in hydrogen production from nuclear power sources and observed that Geoffrey Ballard, founder of Canadian fuel cell producer Ballard Power, publicly supports the idea. However, Fry and other officials indicate a preference for renewable sources of hydrogen production, although current government funding of wind and solar projects is weak. For now Canada continues to produce the majority of its hydrogen from fossil fuels. Major CTFCA partners include Ballard Power Systems, Ford Motor Company, Hydrogenics Corporation, QuestAir Technologies, and Stuart Energy Systems (for more details on these Canadian companies see para 10).

¶4. The National Research Council of Canada (NRC) does significant research related to PEM (proton-exchange membrane) fuel cells and SOFCs (solid-oxide fuel cells). Senior researchers in Ottawa are applying their expertise and lab capacity in materials science towards specific fuel cell applications, while a more focused fuel cell program is growing at NRC's Institute for Fuel Cell Innovation in Vancouver. One project involves reducing the amount of platinum needed in fuel cell catalysts, which could drastically lower their cost. NRC officials emphasize that they are a "crown corporation" distinct from the GOC (which

in any case provides most of their funding). NRCan and its CANMET labs form the epicenter of GOC hydrogen research and policy.

KYOTO RATIFICATION PROVIDES IMPETUS

¶5. The GOC ratified the Kyoto protocol in late 2002 and views hydrogen as a potential tool for important reductions in greenhouse gas emissions. Technology Early Action Measures (TEAM), a division of the Climate Change Action Fund (CCAF), provides investment for technology that promises to reduce emissions while sustaining social and economic development. TEAM, which encourages clean energy solutions that can be marketed quickly, was initially budgeted C$60 million (US$44 million) from its inception in 1998 to 2001. An additional C$35 million (US$25 million) will see it through to 2004. In one example of hydrogen technology investment, TEAM provided C$1.1 million (US$822,000) for an Ontario Power Technologies project in 2000 to build a prototype heat and power plant to run on fuel cells.

¶6. Hydrogen has also attracted attention and funding from Technology Partnerships Canada (TPC), a loan program that supports private sector R&D. For example, TPC invested C$4.34 million (US$3.24 million) in Stuart Energy Systems in 1999 for the design of a cost-effective refueling system for hydrogen-powered buses.

"CANADIAN FUEL CELL COMMERCIALISATION ROADMAP"

¶7. Industry Minister Allan Rock released the "Canadian Fuel Cell Commercialisation Roadmap" on April 15 of this year (information available at www.strategis.ic.gc.ca). In it, the GOC identifies the economic and environmental goals of H2 fuel cell development, such as cleaner air and lower climate-changing emissions levels (towards Kyoto requirements). It views hydrogen as an important energy resource for transportation, heating, and power generation. The GOC believes it holds a world leadership position in this sector and endorses the roadmap as a way to maintain a Canadian edge in a global hydrogen economy. The Roadmap profiles no fewer than 96 Canadian players, 42 of which are GOC agencies (Environment Canada, TPC, NRCan's TEAM, Industry Canada, Transport Canada) or NGOs (CHA, Fuel Cells Canada). The other 54 profiles are broken into three categories: Fuel Cell Producers (Hydrogenics, Ballard Power), Parts and Systems Suppliers (QuestAir, Vandenborre), and Fueling Infrastructure (Stuart Energy). (For details on these participants see para 10).

¶8. Most economic data in the Roadmap is from 2001. The GOC estimates 1,800 Canadian jobs are directly connected and dedicated to the fuel cell industry, 76% of which are located in Western Canada (concentrated in British Columbia). This number is thought to have remained stable over the last two years and represents mostly university and community college graduates. According to the GOC, 2001 fuel cell industry revenues were estimated at C$96.9 million (US$70.1 million), with 70% coming from Western Canada. The GOC predicts 70% revenue growth between 2001 and 2003, resulting in an estimated C$165.2 million (US$119.5 million) in Canadian fuel cell industry revenue this year. For purposes of comparison, the US fuel cell market is estimated to be worth about US$1.4 billion this year (according to a report from the Business Communications Company, Inc., website www.bccresearch.com). Using those numbers, the Canadian fuel cell market is roughly 5% the value of the US fuel cell market, which may seem insignificant until one realizes that 2002 nominal Canadian GDP was about 7% of US GDP. Thus one can see that the fuel cell market is playing an equally important role in the Canadian economy proportionate to the US fuel cell market and economy.

ROADMAP TO GREATER EFFICIENCY

¶9. The "Roadmap" recommends strategies to stimulate early market demand by showcasing technology and educating the public. To improve product quality while reducing cost, the Roadmap promotes information sharing and the adoption of common performance and technical standards between researchers and developers, the private sector, and academic institutions. To help in the financing of H2 fuel cell R&D, the Roadmap proposes tax incentives and matching funds for related investments. The GOC intends to "take a lead role in setting codes and standards for fuel, fuel cells, and fueling systems." The Roadmap concludes with the goal of "developing a national fuel cell strategy within the next year" and incorporating Roadmap working groups into Fuel Cells Canada, an industry association that actually began as part of Industry Canada (see para 14).

SAMPLING OF CANADIAN COMPANIES RECEIVING GOC FUNDS

¶10. The bulk of Canadian private sector H2 R&D efforts (87% of all Canadian fuel cell R&D) is clustered around Vancouver, British Columbia (B.C.), only 150 miles north of Seattle. Another center of private hydrogen activity is in the Toronto area. Following is a summary of some major private sector players with their location, their focus, and their GOC funding:

COMPANY: Ballard Power Systems
LOCATION: Burnaby, B.C. (Vancouver area)
FOCUS/PRODUCT: World leader of PEM (proton exchange membrane) fuel cell manufacturing.
GOC FUNDING: CETC funds in early 90s for fuel cells in city buses; C$8m (US$5.8m) from NRCan, Industry Canada, Environment Canada,and Transport Canada for fuel cells in Ford cars.

COMPANY: QuestAir Technologies
LOCATION: Burnaby, B.C. (Vancouver area)
FOCUS/PRODUCT: Hydrogen and methane harvesting through gas purification and separation.
GOC FUNDING: C$9.6m (US$7m) from TPC for H2 purification technology R&D. Government of British Columbia has also funded QuestAir R&D.

COMPANY: Stuart Energy, owns Vandenborre Hydrogen Technologies (formerly Belgian)
LOCATION: Mississauga, Ontario (Toronto area)
FOCUS/PRODUCT: Hydrogen refueling and power back-up systems. Active in European and Asian markets.
GOC FUNDING: C$5.8m (US$4.2m) from TPC and CCAF for cost-effective and reliable method of refueling hydrogen fuel cell buses.

COMPANY: Hydrogenics Corporation
LOCATION: Mississauga, Ontario (Toronto area)
FOCUS/PRODUCT: Constructs power generation systems based on PEM fuel cells. Named Canada's fastest growing company during last 5 years by PROFIT magazine.
GOC FUNDING: C$500,000 (US$364,000) from NRCan for 10-kilowatt fuel cell power module for use in forklifts, utility and mining vehicles.

SOME CANADIAN COMPANIES ARE WORLD LEADERS IN THEIR FIELD

¶11. The above list details only four of a large group of Canadian companies making significant steps forward in the development of hydrogen technology. The following Canadian firms are considered to be among the world's leaders in their fields:

Ballard Power
PEM (proton-exchange membrane) technology

Dynetek
Compressed hydrogen storage

Greenlight Division of Hydrogenics
Fuel cell systems testing

HERA Hydrogen Storage Systems
Hydrogen storage in light-weight hydride materials and R&D on carbon-based materials for H2 storage.

HYDROGEN ECONOMY OFF TO A GOOD START

¶12. The Canadian private sector foresees strong consumer demand for hydrogen-powered products in the near future and many products are already on the market. Stuart Energy has mobile and permanent hydrogen refueling stations running; Hydrogenics offers portable and stationary hydrogen-run power generators; Ballard fuel cells are in both Coleman Powermate generators and Daimler/Chrysler buses and cars. According to Stuart Energy, modifying a current internal combustion engine to run on hydrogen (cutting emissions dramatically) costs only about US$700, meaning that large numbers of Canadians (and Americans) could be driving hydrogen-powered vehicles today. Companies such as Stuart Energy that are not primarily involved with fuel cell technology (whose practical applications are still 15-20 years away) see the 'hydrogen economy' as a more immediate subset of the larger economy. Instead of replacing contemporary energy sources, hydrogen can complement them and help optimize their use through its ability to store energy during off-peak hours for emergency use during times of heavy demand.

BUSINESS ACROSS THE BORDER

¶13. Private sector players in the US and Canada are showing a healthy degree of teamwork with regard to hydrogen technology and applications. Companies on both sides of the border belong to the same H2 industry organizations (Ballard Power, for example, is a member of the Canadian Fuel Cell Partnership, and Ford Motor Company is a partner of the Canadian Transportation Fuel Cell Alliance). Some companies are conducting joint projects; for instance, US General Motors is working with Canadian firms Hydrogenics and General Hydrogen, and Ford is working with Stuart Energy and Ballard Power. Canadian and American businesses would both benefit from a compatible, balanced and strong hydrogen infrastructure on both sides of the border, so they have an incentive to cooperate in working towards that goal. GOC officials confirmed that any multinational with an office based in Canada qualifies for hydrogen-related government funds, which might make American private investment in hydrogen projects in Canada even more attractive.

H2 INDUSTRY ASSOCIATIONS IN CANADA

¶14. A host of organizations have sprung up in efforts to coordinate the hydrogen-related activities of industries, universities, research institutions, the GOC and provincial governments. Two examples are Fuel Cells Canada (based in the NRC's Institute for Fuel Cell Innovation in Vancouver) and the Canadian Hydrogen Association (CHA, offices in Toronto and Montreal). Fuel Cells Canada, a non-profit industry association that began with support from the National Research Council (NRC), provides support and services for continuing demonstration, development, and deployment of hydrogen fuel cell technology. The CHA, also non-profit, sponsors and organizes meetings and conferences for its members and promotes educational activities in schools. CHA members include Ballard Power, Dynetek, General Hydrogen, Hydrogenics, and Stuart Energy. These two associations form the industry framework for plans like the Fuel Cell Commercialisation Roadmap that call for a wide variety of players dealing in different sectors of the hydrogen economy.

US-CANADIAN COORDINATION: KEEPING THE LIGHT ON

¶15. Although NRCan already collaborates with DOE on hydrogen safety standards and educational outreach projects, their hydrogen managers at the working level are eager for further bilateral coordination. Fortunately NRCan officials say that they do not feel they are duplicating US H2 R&D efforts. While both countries' scientists are researching many of the same issues, they are "developing very specific technologies." In the recent bilateral energy consultations held in Ottawa, the GOC committed to participation in the International Partnership for the Hydrogen Economy (IPHE, REF A), despite concerns of potential overlapping with the International Energy Agency's (IEA's) Hydrogen Control Group (HCG) (REF B).

¶16. COMMENT: While the GOC has a long track record of fuel cell funding and research, its attention to the significant matters of hydrogen production, storage, and transport is relatively new. These areas would benefit greatly from USG-GOC coordination. It is still unclear to some GOC officials how best to engage in successful North American H2 R&D collaboration with the US, which they all agree is very desirable. Post believes that US and Canadian bilateral and multilateral cooperation on hydrogen technologies will help cement both countries' leading positions in the coming global hydrogen economy. END COMMENT.
CELLUCCI